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STERNE, KESSLER, GOLDSTEIN & FOX PLLC
1100 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

| EXAMINER | |
|---|---|
| WOZNIAK, JAMES S | |
| **ART UNIT** | **PAPER NUMBER** |
| 2655 | |

DATE MAILED: 07/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. 09/832,132 | Applicant(s) CHEN, JUIN-HWEY | |
|---|---|---|---|
| | Examiner James S. Wozniak | Art Unit 2655 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *13 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-47* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12,13,15,16,18,20-27,29-38,40-43,45 and 47* is/are rejected.

7)☒ Claim(s) *11,14,17,19,28,39,44 and 46* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 April 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1. In response to the office action from 2/15/2005, the applicant has submitted a request for continued examination, filed 5/13/2005, amending Claims 1, 6, 7, 27, 29, 31, 34, 35, 40, and 42 without adding new matter, while arguing to traverse the art rejection based on the limitation regarding zero input and state response error vectors that are part of a quantization error *(Amendment, Page 28)*. The applicant's arguments have been fully considered but are moot with respect to the new grounds of rejection in view of Cuperman et al *(U.S. Patent: 4,963,034)*.

### *Double Patenting*

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground

provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. **Claims 1-19 and 29-47** are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-24 of copending Application No. 09/832,131 *(U.S. Patent Publication: 2002/0069052)*. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of 09,832,131 recite similar subject matter to that of the present invention, but in a more generic format (*generic error vector as opposed to the specific quantization error vector of the presently claimed invention)*.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 1-10, 12-12, 15-16, 18, 29-38, 40-43, and 45** are rejected under 35 U.S.C. 103(a) as being unpatentable over Marcellin et al (Advances in Speech Coding', Pub. Kluwer Academic Publishers, March 5, 1992) in view of Cuperman et al *(U.S. Patent: 4,963,034).*

In regards to **claims 1 & 29**, Marcellin et al. disclose a Noise Feedback Coding (NFC) system, a method of efficiently searching N predetermined Vector Quantization (VQ) codevectors for a preferred one of the N VQ codevectors to be used in coding a speech or audio signal (Fig 1), comprising the steps of: (a) predicting the speech signal to derive a residual signal (Page 48, Paragraph 3); (b) deriving a response error vector common to each of the N VQ codevectors (Page 48, Paragraph 3 - Page 49, Paragraph 2); (c) deriving N response error vectors each based on a corresponding one of the N VQ codevectors (Page 50, Paragraphs 1 - 2); and (d) selecting the preferred one of the N VQ codevectors as the VQ output vector corresponding to the residual signal based on the response error vector and the N response error vectors (Page 50, Paragraph 2 - Page 51 - Paragraph 1; Eqn 10).

Although Marcellin teaches a method and system for improving the perceptual quality of reconstructed speech that is similar to the claimed invention, Marcellin does not utilize zero-state response and zero input response errors in selecting a preferred codevector, however Cuperman teaches a vocoder for predicting a speech signal, having an associated reconstruction error (Col. 3, Line 48- Col. 4, Line 42). In selecting a vector closest to input speech, Cuperman teaches the utilization of zero input and state response error vectors as part of a reconstruction error (Col. 8, Line 34-Col. 9, Line 23).

Marcellin and Cuperman are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the

art, at the time of invention, to modify the teachings of Marcellin with the method for reconstruction error calculation taught by Cuperman to increase speech reconstruction efficiency by reducing the number of required computations *(Cuperman, Col. 8, Lines 41-45)*.

In regards to **claims 2 & 30**, Marcellin et al. disclose the step of: separately combining the response error vector with each one of the N response error vectors to produce an error energy value corresponding to each one of the N VQ codevectors, wherein step (d) comprises selecting one of the N VQ codevectors corresponding to a minimum error energy value as the preferred one of the N VQ codevectors (Page 49, Paragraph 1). *(Marcellin describes a relationship for the noise feedback filter where a factor $\mu$ is chosen with the goal of suppressing the noise spectrum in frequency bands where the input speech has low energy content, thereby decreasing or minimizing the audibility of the reconstruction noise. The noise spectrum is used to calculate the VQ error energy values)*.

In regards to **claims 3 & 31**, Marcellin et al. disclose the step (b) comprises the steps of: (b)(i) deriving an intermediate vector based on the residual signal (Page 49, Paragraph 2); (b)(ii) predicting the intermediate vector to produce a predicted intermediate vector (Page 49, Paragraph 2); (b)(iii) combining the intermediate vector with the predicted intermediate vector and a noise feedback vector to produce the response error vector (Eqn. 7 - 10); and (b)(iv) filtering the response error vector to produce the noise feedback vector (Eqn. 4).

In regards to **claims 4 & 32**, Marcellin et al. disclose the step (b)(ii) comprises long-term predicting the intermediate vector to produce the predicted intermediate vector (Fig 1($P_L$)); and step (b)(iv) comprises long- term filtering the response error vector to produce the noise feedback vector (Page 49, Paragraph 2).

In regards to **claims 5 & 33**, Marcellin et al. disclose step (b)(ii) comprises predicting the intermediate vector based on an initial predictor state corresponding to a previous preferred codevector (Eqn 6); and step (b)(iv) comprises filtering the response error vector based on an initial filter state corresponding to the previous preferred codevector (Eqn. 7 - 9).

In regards to **claims 6 & 34**, Marcellin et al. disclose the step (b) comprises the steps of: (b)(i) combining the residual signal with a noise feedback signal to produce an intermediate vector (Fig. 1, Page 48); (b)(ii) predicting the intermediate vector to produce a predicted intermediate vector (Page 48, Paragraph 3 - Page 49, Paragraph 1); (b)(iii) combining the intermediate vector with the predicted intermediate vector to produce an error vector (Fig 1 ($r_i$)) [The residual is the error signal that is the difference between the actual speech signal and the modeled/filtered version of the speech signal]; and (b)(iv) filtering the error vector to produce the noise feedback vector (page 49, Eqn 4).

In regards to **claims 7 & 35**, Marcellin et al. disclose step (b)(ii) comprises long-term predicting the intermediate vector to produce the predicted intermediate vector; and step (b)(iv)

comprises short-term filtering the error vector to produce the noise feedback vector (Pages 48 - 49).

In regards to **claims 8 & 36**, Marcellin et al. disclose step (b)(ii) comprises predicting the intermediate vector based on an initial predictor state corresponding to a previous preferred codevector (Fig 1, Eqn 3); and step (b)(iv) comprises filtering the error vector based on an initial filter state corresponding to the previous preferred codevector (Eqn 3).

In regards to **claims 9 & 37**, Marcellin et al. disclose the step (c) comprises the steps of: (c)(i) separately filtering an error vector associated with each of the N VQ codevectors to produce a input vector corresponding to each of the N VQ codevectors (Page 49, Paragraph 1); and (c)(ii) separately combining each input vector from step (c)(i) with the corresponding one of the N VQ codevectors, to produce the N error vectors (Page 49, Paragraph 2).

In regards to **claims 10 & 38**, Marcellin et al. disclose the filtering in step (c)(i) comprises shod-term filtering of the error vector (Fig 1($P_s$)).

In regards to **claims 12 & 40**, Marcellin et al. disclose the step (c) comprises the steps of: (c)(i) separately combining each of the N VQ codevectors with a corresponding one of N filtered, error vectors to produce the error vectors; and (c)(ii) separately filtering each of the N error vectors to produce the N filtered, error vectors (Eqn. 5 - 10).

In regards to **claims 13 & 41**, Marcellin et al. disclose the filtering in step (c)(ii) comprises short-term filtering (Fig 1($P_s$)).

In regards to **claims 15 & 42**, Cuperman further teaches gain calculation and vector scaling using a calculated gain *(Col. 5, Lines 5-40)*.

In regards to **claims 16 & 43**, Marcellin et al. disclose the steps of: deriving a set of filter parameters based on the speech signal; and filtering the N VQ codevectors in step (c)(ii) based on the set of filter parameters (Eqn. 5 - 6).

In regards to **claims 18 & 45**, Cuperman further discloses periodically updating zero state response calculations *(Col. 9, Lines 1-23)*.

6. **Claims 20-27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Marcellin et al in view of Cuperman et al, and further in view of Iijima et al *(U.S. Patent: 5,828,996)*.

With respect to **Claim 20**, Marcellin in view of Cuperman teaches the method for selecting vectors to minimize a quantization error as applied to claim 1. Marcellin in view of Cuperman does not teach an additional processing stage in which a selected codevector is updated to minimize quantization error energy, however Iijima teaches a method for applying a gain to a selected codevector for minimizing quantization error energy *(Col. 23, Line 59- Col. 25, Line 9)*.

Marcellin, Cuperman, and Iijima are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Marcellin in view of Cuperman with the second stage of processing taught by Iijima to improve speech quality by further reducing a quantization error *(Iijima, Col. 25, Lines 6-9)*.

With respect to **Claim 21**, Iijima further teaches the processing of multiple speech residuals *(Col. 2, Lines 41-54)*.

With respect to **Claim 22**, Iijima teaches a means for learning an optimum gain *(Col. 26, Lines 43-56)*.

In regards to **claim 23**, Marcellin et al. further disclose step (f) comprises the steps of: deriving a quantization error energy measure associated with each updated set of N codevectors from step (e)(Eqn 8); selecting an updated set of N codevectors from step (e) as the final set of N codevectors when an error energy difference between the quantization error energy measure associated with the final set of N codevectors, and the quantization error energy measure associated with a previously updated set of N codevectors is within a predetermined error energy range (Page 49, Paragraph 1, Page 50).

Regarding **claims 24 & 25**, Marcellin disclose that the codevectors has a vector-dimension of one or more, whereby each of the codevectors represents a scalar quantity or vector

quantity respectively (page 50) [Marcellin et *al*. describes scalar and vector quantization. It is inherent in the definition that a scalar quantity has a dimension of one and the vector quantization has a dimension greater than one].

With respect to **Claim 26**, Marcellin in view of Cuperman further teaches the method for selecting vectors to minimize a quantization error as applied to claims 1 and 2.

In regards to **claim 27**, Marcellin et al. disclose step (b)(ii) comprises the steps of: combining each of the N codevectors with a corresponding feedback signal to produce the N ZERO-STATE response vectors (Eqn. 5 - 10); and separately short-term filtering each of the N ZERO-STATE response vectors to produce each said corresponding feedback signal (Fig 1($P_s$)).

7. **Claim 47** is rejected under 35 U.S.C. 103(a) as being unpatentable over Marcellin et al in view of Cuperman et al, and further in view of Sasaki *(U.S. Patent: 5,475,712)*.

With respect to **Claim 47**, Marcellin in view of Cuperman teaches the system for selecting vectors to minimize a quantization error as applied to claims 29 and 45. Marcellin in view of Cuperman does not specifically a periodic gain update, however Sasaki teaches updating a gain factor every other frame in Fig. 2.

Marcellin, Cuperman, and ~~Iijima~~ Sasaki are analogous art because they are from a similar field of endeavor in speech coding. Thus, it would have been obvious to a person of ordinary skill in the art, at the time of invention, to modify the teachings of Marcellin in view of Cuperman with

the gain updating method as taught by Sasaki in order to implement adaptive speech reproduction based on changing noise conditions *(Sasaki, Col. 2, Lines 39-51)*.

### *Allowable Subject Matter*

8. Claims 11, 14, 17, 19, 28, 39, 44, and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In regards to **claims 11, 14, and 39**, the claim language that refers to the filtering in step (c)(i) Is based on an initially zeroed filter state, and wherein step (c) further comprises the step of: (c)(iii) zeroing the filter state to produce the initially zeroed filter state before each pass through step (c)(i) is not taught in prior art. Sugihara (U.S. Patent: 5,5493,296) teaches that the detecting means where the signal value fed back to the quantizer is set to zero when the detection means detect that the number of bits of the input signal is less than that of the output signal (CoI 2, Lines 12 - 19).

In regards to **claims 19 and 46**, the combination of Marcellin et al. and Cuperman et al. disclose the speech signal comprises a sequence of speech vectors each including a plurality of speech samples, the method further comprising the steps of: deriving a gain value based on the speech signal once every M speech vectors, where M is greater than one; scaling the N VQ codevectors the once every M speech vectors based on the gain value; and deriving the N error vectors in step (c) only when the gain value is derived the once every M speech vectors, whereby

a same set of N error vectors is used in selecting each of M preferred codevectors in step (d) corresponding to the M speech vectors.

In regards to **claims 17 and 44**, the combination of Marcellin and Cuperman et al. do not teach the speech signal comprises a sequence of speech vectors each including a plurality of speech samples, the method further comprising the steps of: deriving a set of filter parameters based on the speech signal once every T speech vectors, where T is greater than one; and performing step (c) only when a set of filter parameters is derived the once every T speech vectors, whereby a same set of N error vectors is used in selecting each of T preferred codevectors in step (d) corresponding to the T speech vectors.

In regards to **claim 28**, the claim language that refers the step (d) comprises solving the equation below for y.sub.j 36 ( n N j g 2 ( n ) H T ( n ) H ( n ) ] y j = [ n N j g (n ) H T ( n ) qzi ( n ) ] ,where y.subj represents an updated codevector resulting from updating the one of the N codevectors to minimize the total quantization error energy, g(n) represents a codevector scaling factor, H(n) represents a codevector filter transfer function, and qzi(n) represents a ZERO-INPUT response could not be identified in the prior art.

### *Conclusion*

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Jacobs et al *(U.S. Patent: 5,414,796)*- teaches a method for selecting a vector based upon zero input and state response errors.

Yoshihara *(U.S. Patent: 5,432,883)*- teaches a means for minimizing a quantization error by utilizing a zero state response.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James S. Wozniak whose telephone number is (571) 272-7632 and email is James.Wozniak@uspto.gov. The examiner can normally be reached on Mondays-Fridays, 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wayne Young can be reached at (571) 272-7582. The fax/phone number for the Technology Center 2600 where this application is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology center receptionist whose telephone number is (703) 306-0377.

James S. Wozniak
6/8/2005

Susan McFadden
SUSAN MCFADDEN
PRIMARY EXAMINER